DOCUMENT RESUME

ED 287 228 EC 200 533

AUTHOR Newman, Slater E.; And Others
TITLE Rate of Learning Braille with the Left and Right Hand.
PUB DATE Aug 86
NOTE 10p.; For a related document, see EC 200 534.
PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Braille; College Students; Higher Education; *Lateral Dominance; *Learning Processes; Sex Differences; *Tactual Perception; Time Factors (Learning); *Visual Impairments
IDENTIFIERS Handedness

ABSTRACT

Two studies examined the effects of handedness on braille learning. Experiment 1 featured 64 sighted undergraduates at North Carolina State University, all of whom were right-handed and had no experience with braille. Results revealed that females outperformed males, but that, contrary to expectation, no significant effects of handedness were found. In experiment 2, involving 48 right-handed undergraduates (all male), the rate of learning for subjects who studied and were tested with the same hand was greater than for those who used different hands. However, neither the main effect of study hand nor of test hand was significant. Methodological differences which may account for discrepancies in previous research, in which significant effects on braille learning for handedness were found, are suggested. (CL)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED287228

Rate Of Learning Braille With The Left And Right Hand

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
This document has been reproduced as received from the person or organization originating it.
Minor changes have been made to improve reproduction quality.
Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Slater E. Newman

North Carolina State University

Anthony D. Hall

IBM Corporation

Judith C. Amein James E. White, II

North Carolina State University

(Paper presented at the Annual Meeting of the American Psychological Association, Washington, DC, August 22-26, 1986)

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Slater E. Newman
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

ABSTRACT

In two experiments, the rate of learning the names for braille symbols was found to be directly related to haptic discriminability of the symbols, but was not affected by the hand used by the learner, whether the same hand was used on both study and test trials (Experiments 1 and 2) or whether a different hand was used on each study and test trial (Experiment 2). The order of difficulty of the symbols and the pattern of errors were each similar between treatments both within and between experiments. The relationship to findings from other experiments on learning braille with each hand is discussed.

EC 200533

BEST COPY AVAILABLE

IRTP 180, 1

INTRODUCTION

Previous research (Harris, 1980, Experiments 2 and 3; Rudel, Denckla & Spalten, 1974) has shown that right-handed subjects learn the names for braille-like patterns faster using the left than the right hand. One explanation for such findings (Hermelin & O'Connor, 1971) is that braille dot patterns are analyzed more efficiently by the right than by the left hemisphere because of their spatial-configurational design.

This paper reports two experiments. Experiment 1 was done to determine the extent to which the faster learning of braille by the left hand is a function of the haptic discriminability among the symbols whose names are to be learned, and Experiment 2 was done to ascertain whether the rate of learning is faster when the hand used on test trials is the same as that used during study trials. In Experiment 1, gender was also an independent variable, as was symbol discriminability in Experiment 2.

EXPERIMENT 1

Method

Procedure

The subject's task was to learn the names for the first ten symbols of the braille alphabet, A-J, or the second ten symbols, K-T (see Figure 1). Previous research (Newman, Hall, Foster & Gupta, 1984, Experiment 1) has shown that the A-J symbols are easier to discriminate from one another than are the symbols for K-T. Subjects were given five study trials, each followed by a test trial. On study trials, each symbol was presented for 10 seconds along with its letter name; on test trials, each symbol was presented alone for 10 seconds, and the subject was to call out its name. No feedback was provided on test trials. On study and test trials, half of the subjects examined the items with the index finger of the left hand, and the rest of the subjects used the index finger of the right hand. Subjects were not permitted to view any of the symbols during the experiment.

Subjects

The subjects were 64 sighted undergraduates enrolled in the introductory course in psychology at our university. All were right-handed and had no previous experience with braille. Eight males and eight females were assigned through use of a counterbalancing procedure to the four treatment conditions.

Results

A 2 (symbol set) x 2 (gender) x 2 (hand) x 5 (trials) repeated measures analysis of variance was applied to the number correct on each trial. The following effects were significant -- symbol set ($p < .001$), gender ($p < .05$), trials ($p < .001$), and the interaction of symbol set and trials ($p < .001$). Examination of the means showed that females outperformed males

BEST COPY AVAILABLE

RTP 180.1

(39.1% vs. 30.9%), that performance on the A-J set was better than on the K-T set (46.3% vs. 23.5%), and that the difference between performance on A-J and K-T sets increased with training. Contrary to expectation, however, the main effect of the hand used was not significant ($p > .05$), and neither were any of its interactions ($p > .05$). The means for percent correct for each treatment (collapsed over gender) are presented in Table 1.

Two additional sets of analyses were done. The order of difficulty was determined for the symbols in the A-J set and for those in the K-T set. This was done separately for subjects using the left hand and for those using the right hand. The rank-order correlation between left and right hand ($df = 8$) was .96 ($p < .01$) for the A-J set, and the correlation ($df = 8$) was .94 ($p < .01$) for the K-T set. Thus, the order of difficulty for both sets of symbols was similar for subjects using the different hands.

Confusion matrices were constructed for the A-J symbols for subjects using the left hand and for those using the right hand. Confusion matrices were constructed also for the K-T symbols, again separately for each hand. The rank-order correlation ($df = 88$) between hands was .73 ($p < .01$) for the A-J set, and the correlation ($df = 88$) was .61 ($p < .01$) for the K-T set. Subjects thus tended to make the same kinds of errors independent of the hand used during learning.

EXPERIMENT 2

Method

Procedure

In Experiment 1, subjects used the same hand on all study trials and test trials. This was again the case for half of the subjects in Experiment 2; however, for the remaining subjects, the test hand and the study hand differed. There were two other differences from Experiment 1 -- subjects were given three rather than five trials, and all subjects were male. The independent variables were study hand (right or left), test hand (right or left), and symbol set (A-J or K-T).

Subjects

The subjects were 48 sighted undergraduates enrolled in the introductory course in psychology at our university. All were right-handed and had no previous experience with braille. Each subject was assigned to one of the eight treatments through the use of a counterbalancing procedure.

Results

A 2 (symbol set) x 2 (study hand) x 2 (test hand) x 3 (trials) repeated measures analysis of variance gave significant effects for symbol set ($p < .001$), trials ($p < .001$), and the interaction of study hand, test hand, and trials ($p < .05$). Examination of the means again showed that subjects performed better on the A-J set than on the K-T set (42.1% vs. 23.7%).

IRTP, 180, 1

Also, the rate of learning for subjects who studied and were tested with the same hand was greater than for those who used different hands (increases of 26.8% and 8.3%, respectively over the three trials). However, neither the main effect of study hand nor of test hand was significant ($p > .05$), nor were their interactions with symbol discriminability ($p > .05$). The means for percent correct for each treatment are presented in Table 2.

Again, as in Experiment 1, two additional sets of analyses were done. Rank-order correlations ($df = 8$) for difficulty among the four treatment groups (six correlations for each item set, A-J and K-T) showed all twelve to be positive, but only five to be significant ($p < .05$). Examination of the confusion matrices, however, showed all twelve of the correlations ($df = 88$) to be positive and significant ($p < .05$). Thus, again, the order of difficulty of the items and the kinds of errors were both similar across treatments.

CONCLUSIONS AND DISCUSSION

The following conclusions appear warranted:

- In both experiments, subjects who used the right hand performed as well as subjects who used the left hand. This was independent of both the haptic discriminability among symbols (Experiments 1 and 2) and the gender of the learner (Experiment 1). In Experiment 2, however, the rate of learning was faster for subjects who used the same hand on study and test trials than for those who used different hands.

- In both experiments, the haptically more discriminable set of symbols (A-J) was learned faster than the haptically less discriminable set of symbols (K-T).

- Females performed better than males (Experiment 1).

- The order of difficulty of items was similar among treatments, both within and between experiments.

- The pattern of errors was similar among treatments, both within and between experiments.

The results from both of these experiments differ from those of Harris (1980) and Rudel, Denckla & Spalten (1974). In neither of our experiments did the hand used affect the amount learned or the rate of learning; in their experiments, however, performance was better when subjects used the left hand.

There are several differences in method between their experiments and ours that could account for the differences in outcome. Perhaps most relevant for understanding the differences in outcome is that each of their subjects learned one list with the left hand and another list with the right hand, whereas all of our subjects learned only one list, half of the subjects with the right hand and the remaining subjects with the left

RTP 180.1

hand. Since the superiority of the left hand in their experiments was most marked later in training, it may be that we would have obtained comparable results had our subjects been required to learn a second list with their other hand.

An examination of research in which braille symbols have been used suggests that there is no simple answer to the questions, "Which hand is the 'eye' of the blind?" (Harris, 1980) and "Is there a 'best hand' for braille?" (Millar, 1984). Rather, our understanding of possible left-right differences in performance on braille tasks (and concomitantly, perhaps, of differences in hemispheric functioning) can probably best be advanced by careful attention to both the requirements of the task to be performed and the level of each subject's skill on all components of that task (Millar, 1984).

REFERENCES

Harris, L.J. (1980). Which hand is the "eye" of the blind?: A new look at an old question. In J. Herron (Ed.), Neuropsychology of left-handedness. New York: Academic Press.

Hermelin, B. & O'Connor, N. (1971). Functional asymmetry in the reading of braille. Neuropsychologia, 9, 431-435.

Millar, S. (1984). Is there a "best hand" for braille? Cortex, 20, 75-87.

Newman, S.E., Hall, A.D., Foster, D.J., & Gupta, V. (1984). Learning as a function of haptic discriminability among items. American Journal of Psychology, 97, 359-372.

Rudel, R.G., Denckla, M.B., & Spalten, E. (1974). The functional asymmetry of braille letter learning in normal, sighted children. Neurology, 24, 733-738.

AUTHORS' NOTE

Some support for this research was provided through a grant from the North Carolina State University School of Education Small Grants Research Fund.

IRTP, 180, 1

TABLE 1

Mean Percent Correct For Each Treatment During Training:

Experiment 1

Set	Hand	Trials					Overall
		1	2	3	4	5	
A-J	Left	26.3	37.5	53.1	53.1	63.8	46.8
	Right	27.5	40.0	53.8	50.6	56.9	45.8
K-T	Left	13.8	25.0	32.5	23.8	32.5	25.5
	Right	15.6	15.0	24.4	24.4	27.5	21.4

IRFR 1AR, 1

TABLE 2

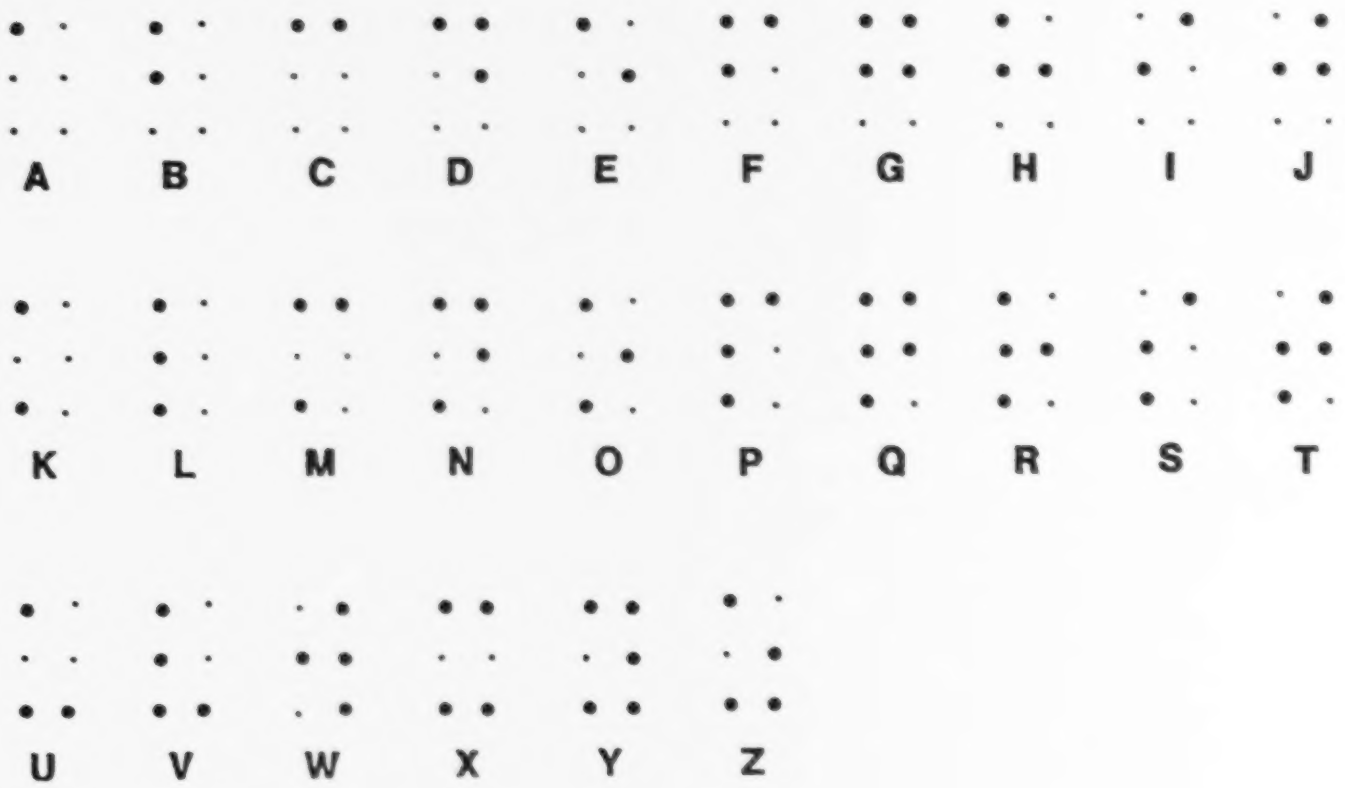
Mean Percent Correct For Each Treatment During Training:

Experiment 2

Set	Study Hand	Test Hand	Trials			Overall
			1	2	3	
A-J	Left	Left	18.3	31.7	60.0	36.7
	Left	Right	43.3	41.7	55.0	46.7
	Right	Left	28.3	35.0	38.3	33.9
	Right	Right	35.0	58.3	60.0	51.1
K-T	Left	Left	15.0	28.3	31.7	25.0
	Left	Right	20.0	20.0	23.3	21.1
	Right	Left	23.3	20.0	28.3	22.7
	Right	Right	11.7	31.7	35.0	26.1

IRTP, 1AA, 1

Figure 1. The Braille Alphabet



RTP 180